

disease than those maturing later. Rich soil was also favorable for disease development. In addition, infection of the young plants from the seed was found to be largely dependent upon the weather during the first four weeks of growth, moisture exerting the greater influence. When rain was plentiful about the time of seeding, wilt later developed in abundance, whereas the same kind of seed planted during dry periods invariably gave less infection. With moisture conditions approximately the same, the later plantings, at higher temperatures, gave the greater amount of wilt.

From the experiments it seemed apparent that anything which retarded the germination and early development of the seedlings lessened the chance of infection from the seed. Of the environmental factors, soil moisture and temperature seemed to have the greatest influence.—*J. B. K.*

#### RADIATION AND THE TEMPERATURE OF SNOW AND CONVECTION OF THE AIR AT ITS SURFACE.<sup>1</sup>

By A. ÅNGSTRÖM.

[Reprinted from *Science Abstracts*, Aug. 31, 1921, p. 549.]

Observations of snow and air temperature and of radiation at Abisko ( $68^{\circ} 21' N.$ ,  $18^{\circ} 47' E.$ ) during the "arctic night," January, 1916, are utilized to evaluate the "convectivity" ( $k$ ) of the air near the snow surface. The actual elements observed included (1) the effective radiation ( $R$ ) by Ångström pyrgeometer exposed about 2 m. above the snow surface, (2) the temperature ( $t_2$ ) of the air at this level, (3) the temperature ( $t_1$ ) of the air 0.6 m. above the surface, (4) the snow surface temperature ( $t_0$ ), (5) the snow temperature ( $t_s$ ) 1.8 cm. below the surface. (1) is reduced to the effective radiation ( $R_0$ ) of the snow surface by the relation

$$R_0/R = (273 + t_s)^4 / (273 + t_2)^4,$$

<sup>1</sup> Ark. f. Mat., Astron. och Fysik. 13. No. 21, pp. 1-18, 1919.

the emissivity of snow for long waves being practically unity, while from  $t_0$ ,  $t_1$ , and  $t_2$  are deduced the vertical temperature gradients at the surface, both in the snow and in the air. Now, considering the time of observation, direct and diffuse solar radiation are eliminated, while exchanges of heat due to condensation and evaporation at the surface are found to be of relatively small importance, and the temperature variations sufficiently slow to allow the surface to be treated as in temperature equilibrium. Accordingly  $R_0 = k(\partial t/\partial h)_{air} - \lambda(\partial t/\partial h)_{snow}$ . Selecting cases in which  $(\partial t/\partial h)_{snow}$  is zero or small, an approximate average of  $k$  is deduced from  $R_0 = k(\partial t/\partial h)_{air}$  and this, when inserted in the previous formula, yields a value of  $\lambda = 0.00049$ , in good agreement with the value 0.0005 deduced from Abel's formula  $\lambda = 0.0068\rho^2$  or the value 0.00059 from Jansson's formula  $\lambda = 0.00005 + 0.0019\rho + 0.006\rho^4$ , where  $\rho$  is the density of the snow. Adopting this value of  $\lambda$ , and utilizing all observations, the average value of  $k$  then becomes 1.8. These values of  $\lambda$  and  $k$  apply when  $R$  is measured in gm. cals. cm.<sup>-2</sup> min.<sup>-1</sup>, and the thermal gradients in deg. C. cm.<sup>-1</sup>. Individual values of  $k$  vary with the wind speed near the surface. In the cases considered, this averaged 2.8 m. sec.<sup>-1</sup> as measured by anemometer 15 m. above ground.—*M. A. G.*

#### HIGH DAY TEMPERATURES IN EUROPE IN JULY.

Press dispatches and excerpts from English newspapers indicate that exceptionally high day temperatures were prevalent during the second week of July in the British Isles as well as in northern and western portions of the Continent. Many heat prostrations and much suffering was recorded. A thunderstorm during the early morning of July 10 in London was featured as being unusually severe.—*A. J. H.*

#### BIBLIOGRAPHY.

##### RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN, Meteorologist in Charge of Library.

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

**Antevs, Ernst.**

Recession of the last ice sheet in New England. With a preface and contributions by J. W. Goldthwait. New York. 1922. xiii, 120 p. illus. plates. 21 cm. (Amer. geogr. soc. Research ser. no. 11.)

**Cave, Charles J. P.**

Winds in the free air. [London. 1913.] 10 p. 22 cm. (Royal inst. Great Britain. Weekly evening meeting. Friday, Apr. 11, 1913.)

**Clayton, Henry Helm.**

World weather. Including a discussion of the influence of variations of solar radiation on the weather and of the meteorology of the sun. New York. 1923. xx, 393 p. illus. plates. 22½ cm.

**Guilbert, Gabriel.**

La prévision scientifique du temps. Traité pratique. Paris. 1922. ix, 438 p. figs. plates. 24½ cm.

**Hamburg, Deutsche Seewarte.**

Funk-Wetter. Liste und Schlüssel der Wetterfunksprüche, funktelegraphischen Zeitsignale und Eismeldungen. 5th Auf. Altona. 1923. 96 p. 23 cm. (Deutsche Seewarte. Abt. III. Juni 1923.)

Funkwetter. Beiheft. 5th Auf. Buchstabenerläuterung und Umrechnungstabellen. Altona. 1923. 32 p. 23½ cm. (Deutsche Seewarte. Abt. III. Juni 1923.)

**Hersey, M. D.**

Diaphragms for aeronautic instruments. Washington. 1923. 32 p. figs. plates. 29 cm. (Nat. adv. comm. for aeron. Report no. 165.)

**International institute of agriculture.**

La météorologie agricole internationale. By Axel Wallén. [1922.] n. p. n. d. p. 496-498. 25 cm.

**International union of geodesy and geophysics.**

Réunion de l'Union internationale de géodésie et de géophysique à Rome en mai 1922. By Axel Wallén. n. p. n. d. p. 488-492. 25 cm.

**Jermin, Frank.**

Currents. p. 18-23. 23 cm. (Great Lakes protective assoc. Annual report. 1922.)

**Kasatkin, I.**

Les mouvements verticaux de l'atmosphère. Moskva. 1914. 169 p. illus. 25½ cm. [Title also in Russian. Text in Russian. Résumé in French.]

**Kentucky agric. exper. sta.**

Annual report . . . of the University of Kentucky. 35th. 1922. Lexington. [1922.] pt. 1. Meteorological observations. 61 p. 23 cm. [Air and soil temperatures, p. 57-58.]

**Lemos, Alix.**

Theoria alamenter do sismographo e determinação experimental das suas constantes. Rio de Janeiro. 1923. 12 p. 18½ cm. (Observ. nac. Rio de Janeiro. Annuário 1923.)

**Letzmann, Johannes.**

Die Peipus-Trombe am 3. August 1922. Dorpat. 1923. p. 8-44. figs. 24 cm. (Sonderab. Sitzungsberichten Naturforsch. Gesellschaft, Univ. Dorpat. Bd. 30, 1923.)

Die Trombe von Odenpäh am 10. Mai 1920. Dorpat. 1922. 11 p. fig. 23 cm. (Acta et commentationes Univ. Dorpatensis. A 3. Misc.)

**Lindblad, Bertil.**

Radiative equilibrium and solar temperature. Uppsala. 1923. 24 p. 29 cm. (*Nova acta Regiae societatis scientiarum Upsaliensis*. Ser. 4, v. 6, no. 1.)

**Minas Geraes. Serviço meteorológico.**

Boletim de normas de temperatura, chuva e insolação correspondentes aos anos de 1914 a 1921. Minas Geraes. 1923. 208 p. maps. 36½ cm.

**Molchenov, P. A.**

Atmosfera. Stroenie i protsessi vozrashchennia stikhii po sovremenii vozzreniiam. Peterburg. 1923. 163 p. illus. 24 cm. [Title and text in Russian.]

**Notes on climate, and other subjects in eastern Mediterranean and adjacent countries.** London. [1916.] 300 p. plates (in pocket). 19 cm. (Prepared on behalf of the Admiralty and the War office. I. D. 1117.)**Quayle, E. T.**

Increasing run-off from the Avoca river basin (due apparently to deforestation.) p. 143-152. 25 cm. (Proc. Roy. soc. Victoria. v. 35 (new series.) pt. 2. 1923.)

**Quervain, A. de.**

Explosion von Oppau am 21. September 1921. p. 10-15. illus. 31 cm. (Schweizer. met. Zentral-Anstalt. Annalen. 1920.)

**Réthly, Antal.**

Magyarország csapadékterképe. (In Gróf, T. P., & others. Zsebatlasz naptárral és statisztikai adatokkal az 1923. évre Kiadja. 1923. p. 157-166.) [With rainfall map of Hungary.]

**Rigg, George B., & others.**

Influence of plants on the air in houses. p. 383-386. 25½ cm. (Amer. journ. botany. v. 10. July, 1923.)

**Sayers, R. R. & Harrington, D.**

Physiological effects of high temperatures and humidities with and without air movement. Effects on body temperature and pulse rate of subjects at rest. [Washington. 1923.] p. 1616-1637. fig. 23½ cm. (U. S. Public health service. Pub. health reports. v. 38. no. 29. July 20, 1923.)

**Shaw, H. Knox.**

Observations of solar radiation, 1915-1921. p. 237-256. 27 cm. (Min. of pub. works. Egypt. Phys. dept. Helwan observ. Bulletin no. 23.)

**Shaw, Napier.**

The air & its ways. The Rede lecture (1921) in the University of Cambridge, with other contributions to meteorology for schools and colleges. Cambridge. 1923. xx, 237 p. illus. plates. 27 cm.

**Sifontes, Ernesto.**

Paginas sobre meteorologia tropical (región de Ciudad-Bolívar.—Guayana.—Venezuela.—S.A. Zona al Sur del río Orinoco)—año 1920. Ciudad Bolívar. 1923. 212 p. 25 cm.

**South Kensington museum, London.**

Catalogue of sky sketches from . . . 1883 to . . . 1886, by William Ascroft. Illustrating optical phenomena attributed to the eruption at Krakatoa, in the Java straits, August 27th, 1883. . . . London. 1888. 18 p. 21½ cm.

**Suhara, Toyotaro.**

New air velocity calculator. Tōkyō. 1922. p. 25-30. illus. plates. 26 cm. (Report Aeron. res. inst., Tōkyō imp. univ. v. 1, no. 2. June, 1922.)

**Sutton, J. R.**

Control of evaporation by the temperature of the air. p. 5-13. 25 cm. (Repr.: Trans. Roy. soc. South Africa. v. 11, pt. 1.)

Some notes on rainfall and run-off in South Africa. p. 41-44. 24½ cm. (South African geogr. journ. v. 5, Dec., 1922.)

**Tamaru, Takurō.**

Hikōki ni taisuru Kaze no Hōkō to Hayasa wo kirokusuru Kikai. [Tōkyō. 1921.] 23 p. illus. 26 cm. (Report Aeron. res. inst. Tōkyō imp. univ. no. 1. Feb., 1921.) [With English abstract.]

**Terada, Torahiko, & Kobayashi, Tatuo.**

On the diurnal variation of winds in different coastal stations of Japan. p. 33-85. figs. 26½ cm. (Report Aeron. res. inst. Tōkyō imp. univ. v. 1, no. 3, July, 1922.)

**Vercelli, Francesco.**

Le scienze fisiche e matematiche nelle opere di Dante. Roma. 1923. 43 p. 23 cm. [Meteorology. p. 23 ffg.] (Rivista marittima. Feb., 1923.)

**RECENT PAPERS BEARING ON METEOROLOGY AND SEISMOLOGY.**

C. FITZHUGH TALMAN, Meteorologist in Charge of Library.

The following titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers and other communications bearing on meteorology and cognate branches of science. This is not a complete index of all the journals from which it has been compiled. It shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau.

*American meteorological society. Bulletin. Worcester, Mass. v. 4. 1923.*

Clough, Homer W. An improved method of computing meteorological normals. p. 72-73. (May.) [Abstract.]

Haas, Nelson W. A method for representing wind directions at different levels on the same chart. p. 71-72. (May.) [Abstract.]

Henry, A. J. Terrestrial temperatures in the United States and the sunspot cycle. p. 680. (May.) [Abstract.]

Humphreys, W. J. Oblique arcs through the sun. p. 70-71. (May.) [Abstract.]

Marvin, C. F. Periodicities in weather and climate. p. 66-67. (May.) [Abstract.]

Marvin, Charles F. The status, scope, and problems of meteorology. p. 73-76. (May.) [Abstract.]

Tingley, F. G. A proposed system of graphical extrapolation of weather data, with possible application to long-range forecasting. p. 69-70. (May.) [Abstract.]

Brooks, Charles F. Local climates of Worcester, Mass., as a factor in city zoning. p. 83-86. (June-July.)

Brooks, Charles F. Unsatisfactory rain insurance policies. p. 82-83. (June-July.)

Gregg, W. R. Meteorology and the record non-stop distance flight of Lieuts. Kelly and Macready. p. 99-100. (June-July.)

Gregg, W. R., & Van Zandt, J. P. The wind factor in flight: an analysis of one year's record of the air mail. p. 89-90. (June-July.) [Abstract.]

Hand, I. F. An examination of the dust content of the atmosphere. p. 92-93. (June-July.) [Abstract.]

Horton, Robert E. Do saturated soils increase rates of flood discharge? p. 95-96. (June-July.)

Horton, Robert E. Keep a ground-water level record. p. 96-97. (June-July.)

Humphreys, W. J. Dusting the clouds for rain. p. 87-88. (June-July.) [Abstract.]

Kimball, Herbert H., & Hobbs, Herman E. A new form of thermoelectric recording pyrheliometer. p. 91-92. (June-July.) [Abstract.]

Meisinger, C. LeRoy. The accuracy of free-air pressure maps. p. 90-91. (June-July.) [Abstract.]

Mitchell, Charles L. Revised tracks of West Indian hurricanes. p. 93-95. (June-July.) [Abstract.]

Sherry, B. J. The meteorological service on the model airway. p. 89. (June-July.) [Abstract.]

Weeks, John R. Basis of rain insurance rates. p. 81-82. (June-July.)

*American philosophical society. Proceedings. Philadelphia. v. 62. no. 2.*

Ward, Robert DeC. The "Indian summer" as a characteristic weather type of the eastern United States. p. 48-56.

*Annalen der Hydrographie und maritimen Meteorologie. Hamburg. 51. Jahrg. 1923.*

Ahlgrimm, Fr. Zur Aufhängung des Meteorographen unter dem Fesselballon. p. 96-97. (April.)

Geiger, Rudolf. Ueber quantitative Messungen an Inversionsflächen. p. 81-90. (April.)

Köppen, W. Die Bora im nördlichen Skandinavien. p. 97-99. (April.)

Schmidt, Adolf. Wie ist das Jahr für meteorologische Zwecke am besten einzuteilen? p. 93-96. (April.)

Schumacher, A. Neuere Versuche zur Messung der Verdunstung von Seenflächen. p. 99-100. (April.)

Bartels, J. Zur Berechnung der täglichen Luftdruckschwankung. p. 153-160. (Juli.)

Perleitz, P. Ueber Wettervorhersage. p. 166-170. (Juli.).